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ABSTRACT

Forty-seven subjects were administered the Dogmatism Scale (D), and Embedded-Figures Test (EFT), and were randomly assigned to a programmed Russian vocabulary lesson with or without strong prompts after a median split stratification of EFT and D. A multiple regress analysis tested the influence of field independence and dogmatism, and their interaction with each other and with treatment conditions. It was predicted that the cognitive style variable would produce both interactive and main effects in an aptitude-treatment interaction framework. Predicted ATI effects were not demonstrated; however, cognitive style was a significant predictor of performance. (Author)

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Field Independence and Dogmatism as Mediators of Performance on a Programmed Learning Task With and Without Strong Prompts

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Paper presented at

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Field Independence and Dogmatism as Mediators of Performance on a Programmed Learning Task With and Without Strong Prompts[1]

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Abstract - 47 Ss were administered the Dogmatism Scale (D), an Embedded-Figures Test (EFT) and were randomly assigned to a programmed Russian-vocabulary lesson with or without strong prompts after a median split stratification on EFT and D. A multiple regression analysis tested the influence of field independence, dogmatism and their interaction with each other and with treatment conditions. It was predicted that the cognitive style variables would produce both interactive and main effects in an aptitude-treatment interaction framework. Predicted ATI effects were not demonstrated; however, cognitive style was a significant predictor of performance.

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TABLE 1

Summary of Multiple Regression Analyses

Dependent Variable	Predictor	R^2	F	df	Partial R
Test 1	FI		2.34	1/43	-.23
	D		4.88*	1/43	-.32
	FI X D		3.39✓	1/43	-.27
	Full Model	.16	2.82*	3/43	
Test 2	FI		0.14	1/43	-.06
	D		1.21	1/43	-.17
	FI X D		2.10	1/43	-.22
	Full Model	.06	.84	3/43	

* < .05
✓ < .10

FIGURE 1

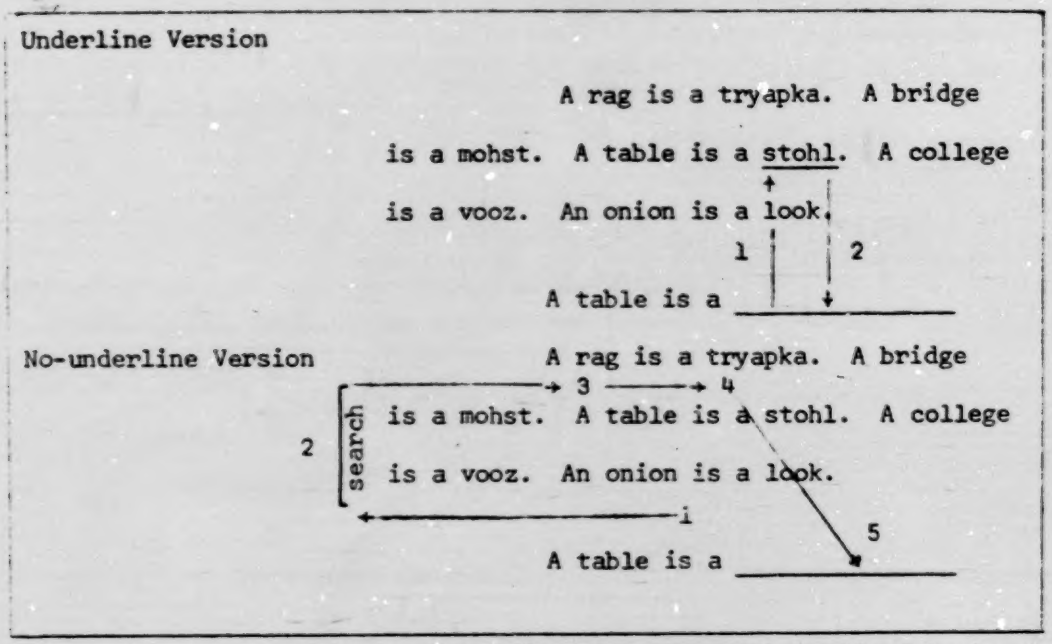

Figure 1: The lines trace the minimal eye movements required to locate the response terms. From Anderson, 1970.

The cognitive style variables Field Independence (FI) and Dogmatism (D) have been demonstrated to affect performance on various cognitive tasks (Greene & Davis, 1971; Grippin, 1973; Grippin & Ohnmacht, 1972). These variables reflect charactersitic, self-consistent ways of functioning in perceptual and intellectual activities. The object of this study was to explore the effects of FI and D on a programmed learning task with and without strong prompts in an aptitude-treatment interaction (ATI) framework.

Bracht and Glass (1968) and Bracht (1970) suggest that the dearth of significant ATI effects reflects the use of global personological variables whose complexity mask any interaction. They further suggest that when personological variables and treatments are more narrowly defined, with treatments designed to capitalize upon different abilities of learners, interactions are more likely to be observed. Cognitive style is one way to match individual learners with specific instructional treatments.

Field independence (Witkin, et.al., 1962), operationally defined in this study by the group Embedded-figures Test (EFT; Jackson, Messick & Myers, 1964), assesses the degree to which Ss differentiate perceptual experiences. It is an individual difference (ID) continuum whose correlates include the degree of scanning of a stimulus field, and the rapidity and correctness of a response to an ambiguous stimulus (Witkin, et.al., 1962). The Dogmatism Scale (Rokeach, 1960) measures a continuum of open-mindedness versus closed-mindedness.

The interactive effects of FI and D have been demonstrated on reversal, nonreversal-shift concept formation (Ohnmacht, 1966), the Remote Associates Test (Ohnmacht & McMorris, 1971), and the Heidbreder concept attainment task (Grippin & Ohnmacht, 1972). Ss who were high

dogmatic and global (field dependent) demonstrated difficulty regardless of shift condition in the reversal-nonreversal shift study and male Ss who were high dogmatic and global scored significantly lower than other groups on the RAT. On the Heidbreder concept attainment task, Grippin and Ohnmacht (1972) found that field independent Ss who were low dogmatic learned design concepts significantly faster than other Ss. The general hypothesis of the currently reported study was that individual differences in FI and D would demonstrate interactive effects in relation to response cues (prompts) provided in programmed instruction units.

Anderson (1970) cautions against the overuse of strong prompts, writing "Whatever advantages prompting may have, ... over prompted programs often permit the student to respond correctly on the basis of prompts alone without paying attention to the entire cue ..."(p. 353). He reports several studies which manipulated underlining of the correct response in a programmed learning frame. In all but one of these studies, Ss recalled more correct responses on an immediate test if the correct response was NOT underlined (weak prompt).

However, cues to the correct response provided in the stimulus context may interact with IDs in cognitive style. In a previous study Grippin (1973) demonstrated the interaction of FI with strong and weak prompt conditions using the programmed Russian vocabulary lesson developed by Anderson and Faust (1967). Mean criterion scores of field dependent sixth grade girls in strong prompt condition were significantly higher than mean scores of field dependent sixth grade girls in weak prompt condition. This effect was maintained over a two-week delay. The current study examined the main and interactive effects of FI and D on immediate and two-week delayed criterion tests in relation to strong and weak prompt

conditions on the above-mentioned Russian vocabulary task.

On an immediate criterion test, interaction effects were predicted for FI, D and treatment (T), which would modify the predicted main effects of FI and D. It was hypothesized that field independent Ss would have higher mean criterion scores than field dependent Ss; that close-minded Ss (high D scores) would have lower mean criterion scores than open-minded Ss; that close-minded field-dependent Ss would benefit from strong prompt conditions. A two-week delayed criterion test was included to assess what, if any, long range effects would emerge.

Method

Ss were 47 paid volunteer undergraduates enrolled in an introductory education course. Each S was administered the Dogmatism Scale (Rokeach, 1960) and a group form of the Embedded-figures Test (Jackson, Messick & Myers, 1964). Ss were randomly assigned to treatments after a median split stratification of FI and D scores.

Each subject worked through a programmed Russian vocabulary lesson described in Anderson and Faust (1967) in one of two forms (see Figure 1).

Insert Figure 1

In one form the correct response was underlined in the stimulus context (strong prompt); in the other form the response term was not underlined (weak prompt), and, therefore, S was required to search the stimulus context for the correct response.

Each S took a 16 item recognition test of English-Russian word pairs immediately after completion of the programmed unit and an alternate form of the same test two weeks later.

A multiple-regression analysis of each test was performed with number correct serving as the dependent variable (Bracht, 1970; Cohen, 1968).

Results

Results of the regression analysis yielded non-significant F ratios ($p > .10$) for treatment condition and interactions with treatment conditions. Subsequent regression analyses did not include these variables as predictors.

Table 1 includes the regression analyses for dependent variables, Test 1 and Test 2, based on number of correct English-Russian word-pair matches. The predictor variables are FI, D, and the interaction term (FI x D).

Insert Table 1

The full-model regression equation for Test 1 is significant ($F=2.82$; df 3/43; $p < .05$), as are the main effect of D ($F=4.88$; df 1/43; $p < .05$) and the interaction effect ($F=3.39$; df 1/43; $p < .10$) No predictor variables were significant for Test 2.

As predicted, close-minded Ss had lower scores than open-minded Ss. However, there was no main effect for FI. The interactive effect was not as predicted. There was no interaction between cognitive style and treatment condition; however, the interaction of FI and D did significantly affect criterion scores with field-dependent, open-minded Ss scoring higher and field-independent, close-minded Ss scoring lower than other Ss.

Discussion

In two studies using the Anderson and Faust Russian-Vocabulary task (1967), we have been unable to replicate a significant main effect for treatment (Grippin, 1973; current study). This may be the result of quite different samples from Anderson et.al. (sixth graders and under graduates versus graduates) or motivational components. Anderson (1970) discusses two studies using this task in which motivational components

were manipulated. When Ss were made to feel their performance was crucial, treatment effects lessened or disappeared. Apparently the treatment effects of weak prompts do not generalize across age differences or motivational states.

ATI and delayed test effects found in an earlier study using this task (Grippin, 1973), but not found in this study may also be the result of different samples and different motivational states. The earlier study utilized sixth-grade students : the current study college undergraduates. The range of abilities sampled was much greater among the sixth graders than among the college students.

However, the results of this study do support the growing body of research indicating the influence of cognitive style variables on performance on learning tasks. High dogmatic Ss experience greater difficulty than other Ss on a variety of tasks. This study suggests that if high dogmatic Ss are also field independent, highly structured tasks, such as programmed learning, may be inappropriate. Research in progress will attempt to delineate the relationships between FI and D as a function of course structure: traditional lecture-test; mastery test-retest; advance question-test.

The educational implications of research on the relationships between cognitive style variables and learning tasks seem clear. Continued research may ultimately lead to truly individualized instruction.

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